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ABSTRACT

The purpose of this study was to investigate effects on comprehension of content material in the three subject areas of science, social studies, and literature. Sixty-nine eighth grade students from the same school served as subjects. The Gates-MacGinitie Reading Test, Survey E, Form 1M, Comprehension subtest, was used to group students into above average, average, and below average groups. Passages were chosen from the content areas using textbooks not in general use at the school. Selected passages were taken in their entirety from each book. Cloze tests were constructed by deleting every fifth word in each passage and replacing the deleted word with a 10-spaced blank. Passages in each subject area were approximately 250 words in length, allowing for 50 deletions. The subjects were administered the cloze tests in a group setting. The results indicated that there was a difference in comprehension due to subject matter. The subjects performed better in the content area of literature than in either science or social studies. This finding held true both for the group as a whole and, in particular, for the group that was above average in reading ability. (WR)

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THE EFFECTS OF DIFFERENT CONTENT AREA MATERIALS UPON THE COMPREHENSION OF EICHTH-GRADE STUDENTS

A THESIS

SUBMITTED TO THE FACULTY

OF THE GRADUATE SCHOOL OF EDUCATION

OF

RUTGERS UNIVERSITY

THE STATE UNIVERSITY OF NEW JERSEY

BY

ELIZABETH DODD

IN PARTIAL FULFILLMENT OF THE

REQUIREMENTS FOR THE DEGREE

OF

MASTER OF EDUCATION

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CHAPTER I

THE PROBLEM

Background of the Problem

Most educators would agree that the terms reading and reading comprehension are almost synonymous. Without an understanding of what is being read, the sound symbol relationship is of little value to the decoder. Although the average reader could pick up a newspaper printed in a highly symbol-print related language such as Polish, and be able to sound the words out phonetically, this decoding would give the reader little or no understanding of the message being communicated. Cleland (1966), Dechant (1964), and Kingston (1961) are but a few of the reading authorities who consider that reading implies a form of meaning emphasis.

The quality of the message communicated through written symbols depends upon the ability of the receiver to assimilate, interpret, and retain the message contained. Present research in reading seems to indicate that comprehension has many facets and can vary due to the content of the material being read. Bracken (1958) suggests that in order to appraise reading effectively in the content areas,

we should consider appraising reading skills separately in English, social studies, mathematics, and science.

Harris (1970) states that content subjects have a specialized vocabulary. Herber (1970) states that both vocabulary and content load in the differing content areas create problems in comprehension for students.

According to Bond and Tinker (1957), there is need for adjustment of reading skills and abilities in the content fields. Comprehension abilities depend upon the organization of the material, the nature of the subject matter, and purposes for reading. In summarizing studies relating to comprehension in content areas, they state that teachers in subject matter fields must know the difficulties inherent in their field and adjust instruction accordingly.

There is a dearth of studies exploring the effects of differing types of subject matter upon comprehension. This study is an attempt to deal with a part of this area of comprehension in differing subject matter.

Statement of the Problem

The purpose of this study was to investigate effects on comprehension of content material in the three subject areas of science, social studies, and literature. The following questions were examined:

1. Would there be a difference in response

patterns of subjects due to content of material when the readability of these passages remained the same?

2. Would there be a relationship between a subject's reading ability as measured by a standardized reading test and his comprehension of differing content as measured by cloze tests?

Hypotheses

1. There will be no differences in the individuals' comprehension of passages taken from the content areas of science, social studies, and literature when measured by cloze tests.

2. There will be no differences in the levels of comprehension achieved by students with above-average, average, and below-average reading ability in the content areas of science, social studies, and literature when measured by cloze tests.

Importance of the Study

Effective instruction presupposes using appropriate materials geared to the needs of the learner. Learning theory tells us that the more meaningful the stimulus, the better the response. The knowledge gained from studies dealing with the effects of content upon comprehension can help the classroom teacher to make adjustments, as needed, in teaching content area subjects.

Although much has been written about the need for every teacher to be a teacher of reading, there are few studies in the content areas dealing with individual performances on similar tests in differing areas of study. A knowledge of varying results at different grade levels can help with the development of more effective teaching strategies. This study can be considered a start in this direction.

Most educators are aware that the subject areas of science, social studies, and literature are different in nature of vocabulary used, concept load, and linguistic patterns. A readability formula cannot be expected to assess the more than 150 identified variables that correlate with reading difficulty. According to Bormuth (1966), these formulas do have a predictive reliability, but are crude at best in measuring all the complexities of our language. Most readability formulas are based on sentence length and syllable count. Bormuth states that there is a need for many varied tests in order to assess individual performance adequately. Increasing knowledge about inherent difficulties due to content should help content area teachers transmit knowledge more effectively.

Definitions of Terms

Reading comprehension.--The process by which a reader recreates in his mind the thought content of the writer by interacting with what the latter produced (Kingston, 1961). For the purposes of this study, the raw score achieved on the cloze tests will be used as the measure of comprehension.

Cloze procedure.--A mechanical systematic deletion of words from reading passages. In this study the tests were constructed by deleting every fifth word in passages of approximately 250 words in length. First and last sentences were left intact. Omissions were replaced by equal (10-space) blanks.

Scoring procedure.--Raw score or number of correct fill-ins by the students. Misspellings were not counted as errors. The use of synonyms was counted as an incorrect response.

Above-average readers.--All those students who scored above the ninth-grade level on the Comprehension subtest of the Gates-MacGinitie Reading Test.

Average readers.--Those students whose scores on the Gates-MacGinitie test were 7-8.9 grade level.

Below-average readers.--Those students who scored below grade 7 level on the Gates-MacGinitie Reading Test.

CHAPTER II

REVIEW OF THE LITERATURE

The Components of Comprehension

"Reading is thinking that results in comprehension [Betts, 1972, p. 58]." Efficient comprehension implies a close match between the message sender and receiver. Reading can be considered a two-step process in which decoding is the preliminary prerequisite for achievement of the major goal, which is understanding. As an early writing by Betts (1957) points out, "the level of abstractions, the language structure and the individual's previous experience function interrelatedly [p. 44]."

According to Stroud (1964), comprehension is a generalized ability to the development of which all teachers contribute. Individuals draw from a stored fund of knowledge in all linguistic behavior, whether it be reading, talking, or writing. This experience background is brought by the reader to each new knowledge acquisition and becomes interwoven and integrated with previous learnings.

Harker (1973) defines comprehension as being basically a problem-solving process in which the student

is expected to understand the reading selection for a definite purpose. The nature of the task determines the method for solving it. Since no comprehension tasks are identical, methods and understanding will vary. He considers comprehension as the result of a dynamic cognitive process rather than stemming from the rigid application of a set of predetermined skills.

Although the skills approach to developing comprehension in the content areas has been espoused by many authorities such as Early (1970) and Paulson (1963), there are supplementary abilities needed for true comprehension in the content areas. As Paulson points out, skills taught through general comprehension type exercises must be applied to the actual reading problems faced in the content areas for comprehension to take place.

Comprehension skills built within a systematic framework or taxonomy may presuppose more precision within the process than exists in reality.

Herber (1970) identifies three levels of comprehension used within the content areas: (1) literal, which is the knowledge of what the author said; (2) interpretive is knowing what the author said to derive meaning from his statement; and (3) the applied level which takes the product of the literal and interpretive and fuses them so that they can be applied to some practical or theoretical

exercise.

Davis (1941, 1968) listed the following as the most significant determiners of good comprehension: (1) recalling word meaning; (2) drawing inferences about meaning from context; (3) finding answers to questions asked explicitly or in paraphrase; (4) weaving together the ideas in the content; (5) recognizing an author's purpose, tone, attitude, and mood; (6) identifying an author's technique; (7) following the structure of a passage; and (8) drawing inferences from content.

The continuing attempts to give the all-encompassing definition of comprehension are indicative of the dynamic complexity of this process. In the opinion of most writers in the reading field, insights gained through linguistic studies of language lead away from any idea of an individual's comprehension being a constant. Rather, there is a tendency to consider that an individual's reading level may "float" (Powell, 1971), depending on interest level of the material, background of experiences, concept load, vocabulary, and writing style. As Farr (1971) points out, while reading tests attempt to measure comprehension as a constant, it varies according to specific reading purposes. These tests can be considered a rough gauge rather than a precise label.

An interesting study which highlights the

difficulties of measuring comprehension was done by Jenkinson in 1957. She used cloze tests to measure comprehension on three types of literary passages: descriptive, metaphorical-allegorical, and ironical. Her findings were that students used structure clues, semantic clues, and approach clues to get meaning. The structure clues involved knowledge of the linguistic patterns of language. The students with high ability recognized syntactic clues more frequently than the low group. There were significant differences in comprehension because of content even though the subject area was literature in all cases.

Comprehension in Differing Disciplines

The goal of reading instruction is the formation of mature readers able to adjust their reading techniques to suit the nature of the material being read. Most reading specialists look upon reading in the content fields as differing from reading a basal text. Estes and Staiger (1973), reporting on the Consortorium of Professional Associations for the Study of Special Teacher Improvement Programs (CONPASS), stated this group's consensus dealing with reading in the content areas. They suggested that classroom instruction should emphasize not only content but also the reading and study processes which would underlie content learning. The curricular materials of each field impose their own specific, unique demands upon

the reader.

An early study by Fay (1954) surveyed the experimental literature in the content areas. His conclusions were that books used should be within the range of an individual's ability to read and comprehend. The student who had not made satisfactory progress in basic reading ability would be handicapped when reading material in the content fields. It would appear that even the student who has adequate ability in dealing with narrative material would still need to develop skills in dealing with factual material.

Swenson (1942) studied a group of 217 eighth-graders. She compared their performances on a general reading test with scores on vocabulary and comprehension in reading science material. Her findings were that those who had good general reading ability also did well in the content area of science. Unfortunately, no correlations were reported in her study.

It must be kept in mind that material in reading tests must be strictly comparable for a high correlation between tests. According to Bond and Tinker (1957), the correlations between general reading tests and reading tests in the content fields range from about .30 to .50. Bond (1940) found rather low correlations between general reading ability and achievement in various areas. He

states that good achievement in one area does not always mean good achievement in another. He suggested that reading measures should be based upon the individual content areas. It appears that differences exist and teachers should be aware of these differences in an individual's varying comprehension.

A recent survey of the research in content fields (Ames, 1971) analyzed the effects of providing reading instruction in specific content fields. Overall, findings were that students who received help in vocabulary prior to reading and had purposes set for reading did better. He questions the value of using material written at different levels in the classroom. He states that simply lowering the reading level of a selection through use of a readability formula does not change difficulty. Concept load may still be difficult, even with simplified vocabulary and shorter sentences. His conclusions would be similar to Herber's (1970) contention that both vocabulary and concept load in content areas texts create problems in comprehension for students. Ames lamented the paucity of research in the content areas.

Smith (1971) analyzed textbooks in the subject areas of mathematics, social studies, and science. He states that there are differing structural or organizational patterns in books written in the various

disciplines. He deplores the uneven readability within the books and states that we are teaching easy words but requiring students to read words that are quite difficult because they are not commonly used. Words such as hybrid, traits, and dominance are not normally found in traditional reading texts. Once taught, they are apt to be remembered longer but they do require introduction. He offers many suggestions to the content teacher for dealing with these difficulties. One primary suggestion is the need to evaluate continually the student's knowledge of the material read.

In an effort to improve instruction in the content areas, there have been several studies done to determine the readability of content area texts. Johnson and Vardian (1973) analyzed books in the area of social studies from five different publishers. They concluded that all of the books would offer difficulty to at least half the children in a given class. They also stated that readability formulas could vary as much as one year from the level reported.

Beard's study (1967), dealing with the comprehensibility of high school texts in the areas of biology, chemistry, American government, and world history, indicated no significant differences within the texts. This study was done with tenth-grade students utilizing cloze

tests. Ten texts were used in each area but comparisons made dealt only with differing difficulty within the subject area. There was no examination of differing comprehension by individuals in the various areas.

The only recent study dealing with the effects of content upon comprehension was that of Aquino, Mosberg, and Sharron (1969). Newspaper passages were used and the content areas studied were science, human interest, and entertainment. The subjects were 225 eighth-grade students of varying reading ability as measured by a standardized test. Cloze tests were constructed from the passages. The mean proportion of correct responses was highest for science and lowest for entertainment. This finding was attributed by the researchers to the higher proportion of prepositions contained in the science passages. There were no significant differences in performance due to reading ability.

In summation, studies dealing with comprehension in the content areas are few and the findings rather contradictory. Most content area teachers are concerned with the students' ability to comprehend assigned text material but are unaware of simple assessment techniques. Knowledge about the range of difficulty an individual may experience in the differing content areas could lead to more successful teaching strategies. It is not just important

to know that there are differences in difficulty due to subject matter, it may be even more important to pinpoint the exact areas of weakness and strength.

Cloze as a Measurement Tool of Comprehension

The cloze technique was first introduced by Taylor in 1953. He used it to measure both readability and comprehension, considered by him to be practically synonymous.

A cloze test is constructed by choosing a passage, deleting every nth word, substituting equal sized blanks for the deletions, and then having the person taking the test fill in the exact word. According to Taylor, cloze is a method of intercepting a message from a transmitter, mutilating its language pattern by deleting parts, and then administering it to receivers. A close reconstruction by the student of the original passage would be synonymous with comprehension of material read.

Cloze as a valid measure of comprehension has been validated by numerous researchers. Farr (1971) considers it a direct measure of literal comprehension. Rankin (1965) states that cloze is especially useful in measuring specific comprehension.

Jenkinson (1957) found a correlation of .82 with objective testing on the same material. Taylor (1956)

found a correlation of .76 between cloze and multiple-choice tests constructed from the same passage. Bormuth (1963) tested students in grades 4, 5, and 6 on passages in the content areas of literature, social studies, and science and found a correlation of .92 between cloze and multiple-choice questions. His findings were that the broad distribution of item difficulties on the cloze tests makes the technique appropriate for use with individuals and groups which vary widely in comprehension ability. Rankin and Culhane (1969) replicated Bormuth's study with substantially the same results. According to Rankin (1959), a cloze test may be used to measure comprehension as a product by administering the cloze test immediately after the reader has finished reading the passage. Ruddell's study (1964) found coefficients of correlation ranging from .61 to .72 between cloze and scores obtained on the paragraph meaning subtest of the Stanford Achievement Test. Scoring synonyms as correct did not make the correlations higher.

Taylor's original study (1953) used 50 deletions in a passage. He chose a mechanical system of counting out every fifth word, deleting it, and substituting equal sized blanks in its place, based on findings that a subject's performance on successive blanks created by an every fifth word deletion is statistically independent.

MacGinitie validated this in a later investigation (1961).

This deletion pattern allows for passage samples to be 250 words in length. According to Taylor (1956), this method allows the chances of mechanically selecting easy or hard words to cancel out, and yields a stable score of the difficulty of a passage or the performance of an individual, regardless of specific words deleted. Since these early studies, researchers have tried various deletion methods (types of words, letters, and varying totals of words between) and most agree that the original criteria as presented by Taylor remain the most valid in measuring comprehension and/or readability. Culhane (1970) states that to facilitate more relevant scoring and to sample a pupil's comprehension effectively, 50 deletions should be used and credit given for exact word only.

In summation, the extent of research into the methodology and validity of cloze testing finds enough agreement by researchers to furnish complete guidelines for both construction and assessment. As Bickley, Ellington, and Bickley (1970) point out, cloze is an effective research tool with untapped potential for other uses.

CHAPTER III

PROCEDURE

The purpose of this chapter is to describe the methods used in conducting this investigation. Included is a description of the subjects involved, the materials used, tests employed, procedures, and statistical design.

Subjects

Participants in this study were all the students in their eighth year of school, excluding kindergarten, in the town of South Bound Brook. A total of 69 students participated in this study. The average age of students was 14. There were three students excluded from the study due to absence on the day of testing. All students were from the same school, Robert Morris #3, the only intermediate school in South Bound Brook.

The Gates-MacGinitie Reading Test, Survey E, Form 1M, Comprehension subtest, was used for the purpose of grouping students into three ability groups: above average, average, and below average. The following criteria were used: above average--grade 9 and above, average--grades 7-8.9, below average--scores below grade 7 (Table 1).

TABLE 1

READING LEVELS FOR ABOVE-AVERAGE, AVERAGE, AND BELOW-AVERAGE EIGHTH-GRADE STUDENTS BASED ON THE COMPREHENSION SUBTEST OF THE GATES-MACGINITIE

Level	N	Mean	Standard deviation
H	36	11.54	1.26
M	20	7.84	.55
L	13	4.91	1.44

Notes.--H indicates above-average students with a reading level of grade 9+.

M indicates average students with a reading level of grade 7-8.9.

L indicates below-average students reading below seventh-grade level.

Materials Used

Passages were chosen from the content areas of science, social studies, and literature using textbooks not in general use at the school. Selected passages were taken from the middle part of each book and were complete passages. The passages were rated according to the Readability Graph (Fry, 1968) at the eighth-grade level of difficulty. The criteria used in selecting passages were: readability, ability of passage to stand alone without a need to read previous pages, and placement of passages halfway through each book. The uneven readability of text material from page to page made selection quite difficult. The texts used were: Science is Understanding (1964), Journies into America (1965), and Eurasia, Africa, and Europe (1956).

Cloze Test Construction

The cloze tests were constructed by retyping passages chosen on mimeograph paper. Every fifth word was deleted and replaced with a 10-spaced blank. Each passage filled one 8-1/2" x 11" sheet. The unmutilated passage was also reproduced on mimeograph paper. This made a total of two sheets for each subject area, with a total of six sheets for all. Passages in each subject area were approximately 250 words in length, allowing for 50 deletions. First and last sentences were left intact.

Administration of Tests and Procedures Followed

Students used in this study had been tested within the past two months by Bound Brook High School guidance personnel in the same surroundings for the purpose of grouping them for high school in the coming 1973-74 school year. Tests used were the Gates-MacGinitie Reading Test and Lorge-Thorndike. Results of the Gates-MacGinitie Reading Comprehension Subtest were used in this present study.

The day before this study was conducted, all students were given a sample cloze passage to first read in an unmutilated form and then to fill in the blanks on the form with deletions. A paragraph from the workbook, Reading for Concepts, Book G, was used. It was explained to the students that cloze was an untimed test of their ability to comprehend the passage and could be considered a practice exercise for the next day's testing. It was also explained to the students that the next day's testing would give each one of them insight into their relative comprehension abilities in content area materials. Results would be shared with them. This was done to establish purpose and proper motivation for testing.

During the trial run all directions were given orally and students were encouraged to raise any questions that might occur to them. Students scored their own samples and discussed them. At the close of the session, general instructions were given for the next day.

Actual testing took place the next day in the gym. It commenced first thing in the morning. Materials were distributed in ABC, BCA, and CAB order to the students, literature being A, science B, and social studies C. Two graduate students from Rutgers and the supplemental teacher assisted in test administration. Instructions to the students included the direction to raise their hands upon completion of any part of the testing so that the next sheet in their particular pattern could be given to them. The students were urged to work quickly but at their own pace. The average time for completion of a test in a given content area was one-half hour. All testing was completed within one and a half hours. All scoring was done by the examiner. Scoring procedure was to total number of correct responses with credit given for misspellings but no credit for synonyms.

Treatment of the Data

Means were computed for scores on the cloze tests in the content areas of science, social studies, and literature for the group as a whole (Table 2) and for each of the ability groups, respectively.

Data for the total sample were analyzed by means of paired sample *t* tests using the Statistical Package for the Social Sciences (SPSS) (Table 3).

Data for comparisons by ability groups were analyzed by the same procedure (Table 4). Results were considered significant at the .01 level.

CHAPTER IV

FINDINGS AND DISCUSSION

This chapter will report the findings of this study. The hypotheses will be discussed first. Then these results will be related to the pertinent literature. However, Chapter II points out that there are no studies available which compare performance in the content areas of science, social studies, and literature. Therefore, this discussion will examine the results of the present study in the light of those studies which seem most relevant to the topic at hand.

Findings

Hypothesis 1. To test the first hypothesis, a comparison was made of comprehension scores achieved by the group as a whole in the three content areas of science, social studies, and literature. Comprehension mean scores for each of the content areas are reported in Table 2. Analyses of variance between areas by the whole group are reported in Table 3.

Test results showed that the scores achieved by the group as a whole in literature were significantly higher than the scores in science and social studies.

TABLE 2

MEAN CLOZE SCORES FOR SCIENCE, SOCIAL STUDIES, AND LITERATURE FOR COMPLETE GROUP (N = 69)

Content area	Mean
Science	28.84
Social studies	26.43
Literature	33.32

TABLE 3

PAIRED SAMPLE t TESTS FOR WHOLE GROUP BY CONTENT AREA (N = 69)

Variable	Mean	$\bar{D}$	$S_{\bar{D}}$	t value	2-tailed probability
Science Social studies	28.84 26.43	2.41	0.943	2.55	0.013
Science Literature	28.84 33.32	-4.48	1.008	-4.44	0.0001*
Social studies Literature	26.43 33.32	-6.88	1.009	-6.82	0.0001

*Significant at the .01 level of confidence.

Results in the latter two areas indicated little difference in mean scores. Thus, the first null hypothesis was rejected. At the eighth-grade level, the group as a whole scored significantly better in literature than in the content areas of science and social studies.

Hypothesis 2. To test the second hypothesis, a comparison was made of the comprehension scores achieved by the three ability groups consisting of above-average, average, and below-average students in the three content areas of science, social studies, and literature. The comprehension mean scores for each reading ability group have been reported in Table 4.

Significant differences were found in comprehension due to differing subject matter. For the average and above-average readers, scores in literature were significantly higher than either science or social studies. In the below-average group, scores in social studies were significantly lower than either science or literature. These latter two content areas were not significantly different from each other but the trend to higher scores in literature was there.

Discussion

The findings of this study appear to agree with those studies that indicate there is a difference in the nature of content area writing which would have some effect upon the comprehension of the reader.

TABLE 4

PAIRED SAMPLE t TESTS BY ABILITY GROUPS FOR SCIENCE, SOCIAL STUDIES, AND LITERATURE

Variable	Mean	$\bar{D}$	$S_{\bar{D}}$	t value	2-tailed probability
	Above average N = 36				
Science Social studies	31.44 30.94	0.50	0.98	0.51	0.613
Science Literature	31.44 36.81	-5.36	1.41	-3.80	0.001*
Social studies Literature	30.94 36.81	-5.86	1.23	-4.76	0.0001*
	Average N = 20				
Science Social studies	28.15 24.90	3.25	2.30	1.41	0.175
Science Literature	28.15 33.30	-5.15	1.76	-2.93	0.009*
Social studies Literature	24.90 33.30	-8.40	1.86	-4.63	0.0001*
	Below average N = 13				
Science Social studies	22.69 16.31	6.38	1.95	3.26	0.007*
Science Literature	22.69 23.69	-1.00	2.38	-0.42	0.682
Social studies Literature	16.31 23.69	-7.38	3.12	-2.36	0.036

*Significant at the .01 level.

The performance by the group as a whole and by the ability group which indicated that literature passages are least difficult to comprehend is in agreement with the findings of Herber (1970). He relates that both vocabulary load and density of concepts in content areas create difficulties in comprehension for students. The findings of this study agree with the views expressed by Smith (1970) who says there are more inherent difficulties built into subjects such as science and social studies in contrast to the more familiar framework of literature.

By contrast, a recent study (Aquino et al., 1967) showed rather contradictory findings in that their subjects achieved better comprehension levels for science passages and that varying reading ability of the group had no significant effect upon performance. The difficulty in comparing this study to the present one is attributed to the nature of the content fields explored in Aquino's study: science, human interest, and entertainment; and source of passages: topical newpaper material, which may not have dealt with familiar items to the readers. Also, the readability level of the articles used was not stated in this study.

Although the researcher was unable to locate any study exploring the differing nature of comprehension in the content areas of science, social studies, and literature, the results of this study are in accord with the views of most reading authorities (Ames, 1971; Estes, 1973; Fay, 1954; Herber, 1970; Smith, 1970, among others) who consider

that content areas present difficulties and require reading skills dependent in part on a subject's general reading ability.

The Jenkinson study (1957), which found that the reader uses many approaches to unlock the message of the printed word, had results similar to those of the present study. Her findings that students with above-average reading abilities perform significantly better were similar to the results of this study.

Fay's (1954) statement that the student who had not made satisfactory progress in basic reading ability would be handicapped when confronted with the curricular demands of differing content areas was also substantiated by this study.

The uneven performance displayed in this study by all students in the three content areas appears to be in agreement with those researchers who look upon comprehension as a dynamic cognitive process, problem solving in nature, and varying due to the nature of the reading task involved (Harker, 1973; Powell, 1971).

Estes' (1973) statement that differing content areas require some specialized techniques in order to insure adequate comprehension, including an introduction of unfamiliar vocabulary, study guides, and exploration with students of the organizational patterns of various texts, is a corollary to the findings of this study.

This study would also seem to indicate the need for ongoing assessment in the content areas because individuals do perform differently in various reading tasks.

CHAPTER V

SUMMARY, CONCLUSIONS REGARDING HYPOTHESES, AND SUGGESTIONS FOR FURTHER RESEARCH

Summary

This study examined the effect of three different content area materials upon comprehension. Eighth-grade students were tested by means of cloze tests constructed from textbook passages in the content areas of science, social studies, and literature written at the eighth-grade readability level (Fry, 1968).

The sample population consisted of eighth-grade students. These students were divided into three ability groups from the results of the standardized reading test. This grouping was used to test the second null hypothesis.

Two null hypotheses were tested. The first was that there would be no difference in the student's comprehension of passages taken from the content areas of science, social studies, and literature. The second hypothesis was that there would be no difference in the student's level of comprehension for above-average, average, and below-average readers due to differing content. Statistical analysis of the data was determined by computing means and using paired sample *t* tests.

Conclusions

The results of this study show that there was a difference in comprehension due to subject matter. The students tested performed better in the content area of literature than in either science or social studies. This finding held true both for the group as a whole and in particular for the group above average in reading ability. It would appear that comprehension is multi-faceted and teachers must take into account the particular demands imposed by the curriculum materials. Assessment and evaluation are required to be continuous and ongoing as differing content area materials are taught. For all students there was an observable linear trend to the data showing higher scores for literature.

Limitations

The conclusions of this study should be interpreted in view of the following limitations.

The first is that the only grade level used in this study was the eighth. Hence, results of this study should be generalized only to students at this particular grade level. All generalizations above and beyond this grade should be regarded with caution.

The second limitation is embodied in the selected population, which is the product of a small suburban town. It might be difficult to generalize results to an urban or rural population.

Recommendations

The results of this study indicate the need for additional research testing comprehension by means of cloze tests in the content areas. These studies should be done to extend and broaden the knowledge gained from this investigation.

Another future research area is the extension of this study to grades in the elementary and high school not covered in this study. Specifically, the effects of content area material should be studied at the intermediate grades, down to the third and fourth grades. Intermediate students often encounter a number of content area teachers who are not always cognizant of the reading abilities of these students. It is not uncommon today for content-centered teaching to begin at third- and fourth-grade levels.

This study should also be extended to both high school and college students, especially those in junior college. As long as the textbook remains the primary vehicle used to transmit knowledge, it is important for the instructor to gain insight into the relative difficulties in comprehension which students might experience in reading required texts in the differing disciplines.

It is further suggested by this examiner that the classroom teacher utilize tests constructed in a similar

manner (cloze) for the purpose of facilitating instruction. Not only would the use of cloze tests in the content areas help in instructional planning, but there is a strong possibility that oral analyses by students of their responses would give them better insight into their comprehension strengths and weaknesses.

Textbook publishers could easily incorporate this type of test into the textbooks they publish. Teachers could then administer these tests before instruction and perhaps eliminate instruction which might be redundant to the learner.

Further studies in this area would provide a more scientific basis for what good reading teachers have suspected all along--namely, that it is harder for children to understand what is written in a content area textbook than magerial written in traditional literature style.

Textbook publishers could easily incorporate this type of test into basic texts. Teachers could then use these tests to identify areas which need illumination.

Further studies of a substantive nature are indicated to attempt to identify precisely those components of literary style which serve to make literature readings most comprehensible to students.

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APPENDIX A

** GATES-MacGINITIE READING TEST

** CLOZE TEST SAMPLE PASSAGE

CLOZE TEST IN SCIENCE

CLOZE TEST IN SOCIAL STUDIES

CLOZE TEST IN LITERATURE

**Deleted because of copyright restrictions.
Gates-MacGinitie Reading Tests, Survey E, Form 1M, Speech & Accuracy Vocabulary, Comprehension, 1964.
"The Big Puzzle" W. Liddle (Ed.), Reading For Concepts, Book C. New York: McGraw-Hill, 1971

CLOZE TEST IN SCIENCE

How do Electric Heating Appliances Become Hot?

You have learned that a wire or any conductor offers some resistance to the flow of current. This resistance, or electrical friction, changes some of the electrical energy into heat. So some heat is produced in every conductor that carries a current. The amount of heat depends on two things: (1) how much current flows through the conductor and (2) how much resistance the conductor has. The larger the current and the higher the resistance, the larger is the amount of electrical energy changed into heat. With the same resistance, twice as much current produces four times as much heat. But twice as much resistance produces only twice as much heat with the same current.

When an electric heating appliance is turned on, the same current flows through the connecting wires and the heating element. This is true since they are all in series with the source of electrical energy. If the same current flows through several conductors, the one with the highest resistance will produce the most heat. Large insulated wires, ordinarily of copper, connect the heating element with the rest of the circuit. These connecting wires have a low resistance because of their size and

material. They are always somewhat warmer when a current flows through them. Yet we usually do not notice the heat. For it is given off as fast as it is produced along the entire length of the wires.

You can now understand why the heating element becomes hot instead of the connecting wires. It has a far higher resistance than they have. So more electrical energy is changed into heat when a current flows through the heating element. Since all the heat is produced near one place, it cannot be given off fast enough. As a result, it makes the heating element hot.

You have learned that a wire or any conductor offers some resistance to the flow of current. This resistance, or electrical _____, changes some of the _____ energy into heat. So _____ heat is produced in _____ conductor that carries a _____. The amount of heat _____ on two things: (1) _____ much current flows through _____ conductor and (2) how _____ resistance the conductor has. _____ larger the current and _____ higher the resistance, the _____ is the amount of _____ energy changed into heat. _____ the same resistance, twice _____ much current produces four _____ as much heat. But _____ as much resistance produces

_____ twice as much heat _____ the same current.

When _____ electric heating appliance is _____ on, the same current _____ through the connecting wires _____ the heating element. This _____ true since they are _____ in series with the _____ of electrical energy. If _____ same current flows through _____ conductors, the one with _____ highest resistance will produce _____ most heat. Large insulated _____, ordinarily of copper, connect _____ heating element with the _____ of the circuit. These _____ wires have a low _____ because of their size _____ material. They are always _____ warmer when a current _____ through them. Yet we _____ do not notice the _____. For it is given _____ as fast as it _____ produced along the entire _____ of the wires.

You _____ now understand why the _____ element becomes hot instead _____ the connecting wires. It _____ a far higher resistance _____ they have. So more _____ energy is changed into _____ when a current flows _____ the heating element. Since all the heat is produced near one place, it cannot be given off fast enough. As a result, it makes the heating element hot.

CLOZE TEST IN SOCIAL STUDIES

Northern Poland: Chiefly a Plain

The land is low and nearly level. An extensive plain begins at the Baltic Sea on the north and rises very gently toward the south. This plain is a continuation of the North German Plain which extends eastward to join the vast Russian Plain. At the southern edge of Poland we see that the plain finally gives way to a hilly belt which, in turn, gives way to high mountains along the border of Czechoslovakia:

The combination of low and nearly level land and a humid climate has produced many swampy spots in the Polish lain. This is especially true in the northern half of the plain, which is the lowest portion. Also, the Polish Plain, like the North German Plain, was once covered by great ice sheets. The ice sheets left many little basins where water has collected to form lakes or swamps. In northeastern Poland especially there are many small lakes that form a definite lake district.

Navigable rivers cross the plain. Most of the Polish Plain is drained by the Vistula River and its tributaries. This river rises far to the south in the Carpathian Mountains. It roughly forms the letter S as it winds northward for about 650 miles before it empties into the Baltic Sea. The Vistula is a broad and navigable

river that has been used for over six hundred years to float timber to the sea. Canal connections with other rivers are easily made across the low plain. These connecting canals carry many kinds of products from one part of Poland to another. The Vistula River is so important that it has been called the "Main Street of Poland."

The land is low and nearly level. An extensive plain begins _____ the Baltic Sea on _____ north and rises very _____ toward the south. This _____ is a continuation of _____ North German Plain which _____ eastward to join the _____ Russian Plain. At the _____ edge of Poland we _____ that the plain finally _____ way to a hilly _____ which, in turn, gives _____ to high mountains along _____ border of Czechoslovakia:

The _____ of low and nearly _____ land and a humid _____ has produced many swampy _____ in the Polish Plain. _____ is especially true in _____ northern half of the _____, which is the lowest _____. Also, the Polish Plain, _____ the North German Plain, _____ once covered by great _____ sheets. The ice sheets _____ many little basins where _____ has collected to form _____ or swamps. In northeastern _____ especially there

are many _____ lakes that form a _____ lake district.

Navigable rivers _____ the plain. Most of _____ Polish Plain is drained _____ the Vistula River and _____ tributaries. This river rises _____ to the south in _____ Carpathian Mountains. It roughly _____ the letter S as _____ winds northward for about 650 _____ before it empties into _____ Baltic Sea. The Vistula _____ a broad and navigable _____ that has been used _____ over six hundred years _____ float timber to the _____. Canal connections with other _____ are easily made across _____ low plain. These connecting _____ carry many kinds of _____ from one part of _____ to another. The Vistula River is so important that it has been called the "Main Street of Poland."

CLOZE TEST IN LITERATURE

Stephen's First Week

Stephen Lesvedin was in America. At last he was here--a place dreamed of for almost as long as he remembered. The American soldiers stationed in the little South Austrian town had teased him about coming. Now he was here.

That fact was the only unconfused thing in Stephen's life at the moment. Everything else was a merry-go-round, a kaleidoscope of confusion. The talk went on around him--talk he could understand if only he could have time to figure it out. But it went so fast and switched so often and was always being interrupted with laughter and fussing and teasing and frowns. While he was making sure he understood the comment Madame had made, the little one, Ellie, had spilled her milk, and Lucy was jumping and fussing, and the father was laughing, and Ricky was talking about hunting. All at once the talk exploded around him.

The food was confusing, too. At first, it was just a miracle, a three-times-a-day wonder. Two eggs for breakfast the first morning, and surely that was only because he was new. But after a week there had always been two eggs every morning for breakfast for every member of the family. Twelve eggs every day! Surely they would

sometimes run out. And the sweets! And the full-flavored bread! And the great slabs of butter to go on the bread.

Stephen had made so many funny mistakes that first week, all because he could not seem to get it into his head that there was so much plenty. The soap, for instance. He chuckled to himself as he thought about it.

Stephen Lesvedin was in America. At last he was _____--a place dreamed of _____ almost as long as _____ remembered. The American soldiers _____ in the little South _____ town had teased him _____ coming. Now he was _____.

That fact was the _____ unconfused thing in Stephen's _____ at the moment. Everything _____ was a merry-go-_____, a kaleidoscope of confusion. _____ talk went on around _____--talk he could understand _____ only he could have _____ to figure it out. _____ it went so fast _____ switched so often and _____ always being interrupted with _____ and fussing and teasing _____ frowns. While he was _____ sure he understood the _____ Madame had made, the _____ one, Ellie, had spilled _____ milk, and Lucy was _____ and fussing, and the _____ was laughing, and Ricky _____ talking

about hunting. All _____ once the talk exploded _____ him.

The food was _____, too. At first, it _____ just a miracle, a _____-times-a-day wonder. _____ eggs for breakfast the _____ morning, and surely that _____ only because he was _____. But after a week _____ had always been two _____ every morning for breakfast _____ every member of the _____. Twelve eggs every day! _____ they would sometimes run _____. And the sweets! And _____ full-flavored bread! And _____ great slabs of butter _____ go on the bread.

_____ had made so many _____ mistakes that first week, _____ because he could not _____ to get it into _____ head that there was _____ much plenty. The soap, for instance. He chuckled to himself as he thought about it.